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P A P E R

I N

MANUFACTURES.



MANUFACTURES.

The Society had long considered the **WEAVING FISHING-NETS** as an object of very considerable importance, and during many years offered Premiums for obtaining that end, but without success, till this Session ; when a proper Specimen of the Netting having been produced, and found, on examination, to have every requisite wished for, the Premium of **FIFTY GUINEAS** was adjudged to Mr. J. W. **BOSWELL**, of Barnstaple, the Inventor of a Machine of which a Plate is annexed, and a Sample of the Netting reserved in the Society's Repository for the inspection of the Public.

S I R,

I BEG leave to present, for the inspection of the Society, a sample of Net, more than eight feet wide and thirty yards long, made on a machine of my own invention.

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On

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On this machine sixty-eight meshes are made at the same time, and by the same motion, with a perfect fast knot, the same as used by fishermen, and the net made thereby has a perfect selvedge; circumstances which, as they include whatever is regarded as necessary to perfection in Netting, will, I humbly hope, entitle me to the approbation of the Society for this invention, and procure me the distinguished honour of their Premium offered for the best specimen of Netting.

I send along with this a voucher, signed by the Mayor, some of the Corporation, and other most respectable inhabitants of this town, who saw me make Net on this machine: this, though not ordered, I send, that no proof of the truth and reality of the invention may be wanting to the Society.

I hope soon to present a sample of exceeding fine Net, in imitation of lace, made on a finer machine, which I have now nearly ready for working. This invention, as a circumstance equally curious and novel, may be of great utility to this country,

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country, in diminishing the large sums that annually leave it for the importation of lace.

I am, SIR,

Your very humble servant,

J. W. BOSWELL.

*Barnstaple, Devon,
Dec. 7, 1795.*

Mr. MORE

WE, whose names are hereunto subscribed, do testify and declare, that we saw J. W. Boswell, of the town of Barnstaple, in the county of Devon, make Netting, such as is used in the Herring Fishery, on a machine by which he made sixty-eight meshes at the same time, and by the same motion.

And we testify, that we examined the knot used in this Netting, and found it to be the same as that used by fishermen in their nets, and esteemed by them the fastest and best knot; and we declare, that we saw the breadth of the said Netting mea-

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fured

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fured as it was taken from the machine on which it was made, and that it exceeded six feet by more than two feet.

CHARLES MARSHALL, Mayor.

H. GARDINER TIPPETTS, Senior
Alderman.

JOHN ROBERTS.

WILLIAM SPURWAY, Clerk.

JOHN CUTLIFFE.

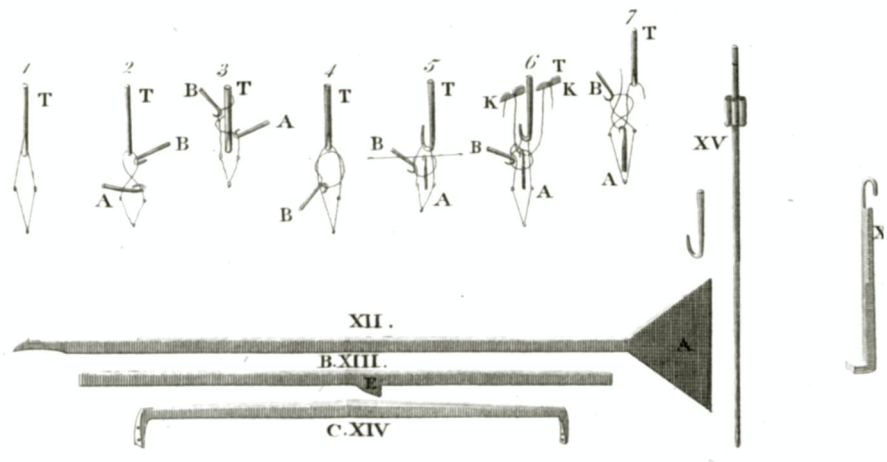
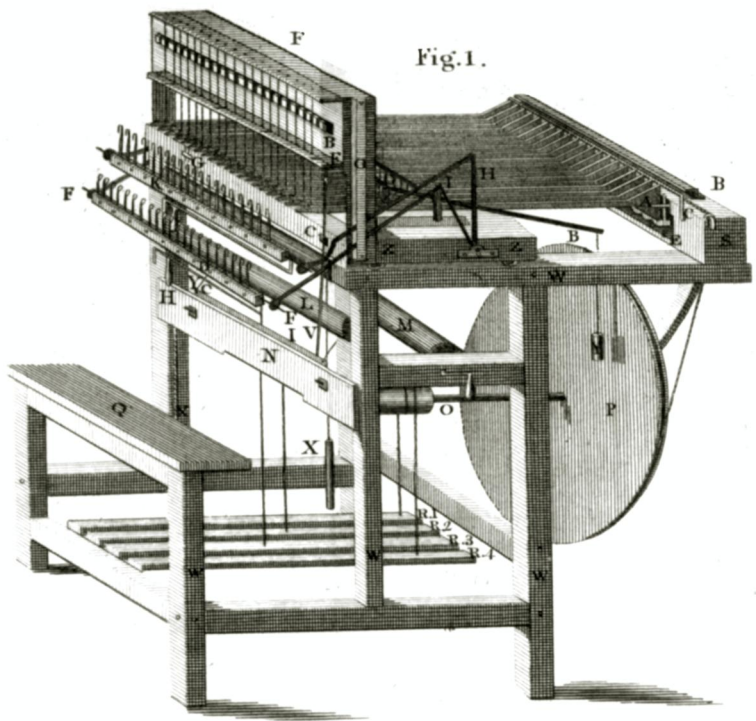
JOHN HILL, Surgeon.

JOHN JENKINS.

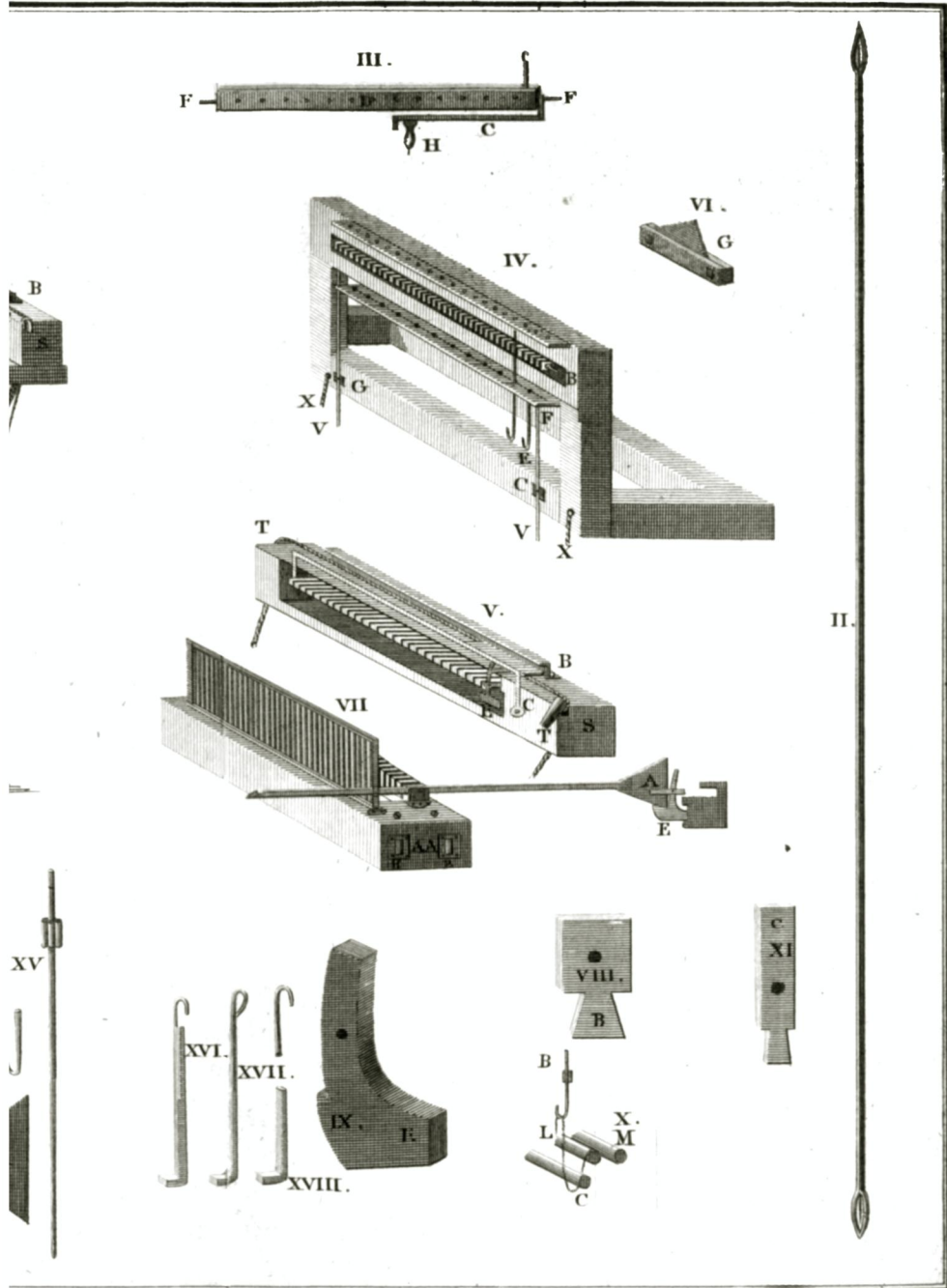
MR. BOSWELL had the above-mentioned machine made in my factory. I saw the various stages of its construction, and, when complete, I saw him make Net upon it. The machine is very simple, and not in the least complicated in any respect; and the above account is exact.

R. MARCH.

Description



Mr. Boswell's. Machine for W.



*Description of the Plate of Mr. J. W. Bos-
WELL's Netting Machine.*

Fig. i. An oblique view of the machine.

A (shewn more distinctly in *fig. xii*), is supported on its centre, and rests on the catch, E, at its extremity : when the catch, E, is moved, the extremity of A falls on a bar of wood placed under it, whose distance from E regulates the length of the meshes of the net (this bar could not be represented in this view). The extremity of A is made large, that it may act as a weight, and should weigh near a pound weight; by its shape, it keeps A between the comb at the catch, E ; so that, in rising to the catch, it cannot escape it at either side : its head rises between the turning hooks in the part F, and, as it rises, draws up the twine passed through the formed meshes (as will be described), to form a new row of meshes. Its centre is supported on a thick wire in the comb (better seen in *fig. vii*) ; its front passes through a sleigh, represented in *fig. vii*, to keep it from shifting to either

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side :

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side: the comb is composed of pieces of brass, of which *fig. viii* is the exact representation in shape; the lower part, B, of thin pieces, secured between two flat bars of iron transversely, and made fast by pewter cast between them: those flat bars are rivetted together at each end to a piece of iron placed between them, of the thickness of the breadth of the lower part, B, of *fig. viii*, and have pieces projecting from them at right angles, by which they are firmly screwed to the mahogany frame, A A, *fig. vii*. The sleigh is screwed to the top of the frame, A A, in the front; and the said frame, A A, is screwed down to the stand of the machine (the sleigh is made in the same manner as stocking-frame sleighs are made). The extremity of the part, A, *fig. i*, rests on the catch, E, which is represented in *fig. ix*; this catch, E, is supported on a thick wire through its centre in the comb, as represented in *fig. v*: this comb is composed of pieces of brass, of which *fig. xi* is the exact representation, fixed in the same manner as the comb already
ready

ready described; the front part, C, of this part, *fig.* xi, is thus elongated, that it may pass between the extremities of the parts A, *fig.* i, and serve as a guide to prevent their missing the catches: the comb is screwed to the piece of deal, S, and a deep groove cut under it for the extremities of the catches to play in. The piece S is screwed to the stand of the machine, as seen in *fig.* i. There are sixty-nine of the parts, A, *fig.* i, and sixty-nine catches; seventy of the parts, *fig.* viii, and seventy of the parts, *fig.* xi. The parts A, *fig.* i, are called jacks: to move the catches from the end of the jacks, and let them fall, the flur, *fig.* vi, passes behind them; and, as it moves, its inclined plane, G, pushes the top of the catches forward, and consequently moves the bottom parts from the jacks: the inclined plane of the flur runs within the part C of *fig.* v, which keeps it from rising up, and its back part or body runs in the part B, *fig.* v, made of sheet-iron, which keeps it from starting back. T T, *fig.* v, are boxes which hold pullies, over which the cord, which is

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fastened to, and moves the slur, passes, round the large wheel P, *fig. i*, which, as it moves half round and back again, moves the slur backward and forward: the slur is composed of two pieces screwed together, that the inclined plane on the lower piece may be put forward to the proper point for throwing off the catches. The large wheel, P, is moved by the axle, O, on which is a roller, round which cords pass to a treadle at each side, so that, by pressing down the treadle, R, *fig. i*, the slur moves to the left, and, pressing R, *fig. iv*, moves to the right: the axle, O, is supported in front by part of the stand, and at the back by two oblique pieces screwed above to the piece S, which meet in a point to support the axle behind: when the slur has moved off all the catches, and the jacks are all fallen, the jacks are brought into their first position into the catches, by the bar, *fig. xiv*, that passes above, across them all, and is screwed at each end to the parts B, one of which is represented more at large, *fig. xiii*, and is counterbalanced by the weight,

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weight, Y, at the other extremities of the parts B. On the part B is a catch, F, which will be explained. Two strong wires pass from the ends of the bar, *fig. xiv*, downwards, to the end of a flat wooden piece that lies behind N, from the centre of which a cord passes to the treadle, R, *fig. ii*; on pressing down which, all the joints are put into the catches, and another motion performed, which will be explained: as the weight is very great, the treadle, R, *fig. ii*, may be assisted with a moveable pulley. F is a frame of mahogany, represented in full, *fig. iv*: this frame is moveable backwards and forwards, and is kept in its place by the fixed frame, *fig. vii*, which it encloses; it is armed with flat pieces of iron screwed on at the places of friction, and the friction is eased by brass rollers, B B, fixed at the end of the frame, *fig. vii*, and the brass rollers, Z Z, in the stand of the machine, on which rollers the frame, F, rests: this frame supports sixty-eight turning hooks, one of which is drawn of a larger size, *fig. xv*; these hooks turn in
the

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the brass pieces, C and F, *fig. iv*; the upper part in holes drilled to fit them, and the lower part in the collars which are formed in F, by the holes made between it and the small pieces screwed in its front, which are made so in preference to being in one piece, that, if any of the hooks should be broken, it may be taken out without disturbing many of the rest: at each end of the sixty-eight turning-hooks, there is a fixed hook, E, whose use is to guide the twine for forming the new meshes: to this frame is also screwed the supports of the jointed frames, H and I, which support the pieces, D and K, at their extremities; the double joints of these frames allow D and K to be moved up and down and backwards and forwards; and at G are screwed two pieces of flat iron at each side of the frame, with proper intervals between them, of the size of the sides of the frame, H and I, between which those sides move freely up and down, backwards and forwards; but which prevents all lateral motion. The part D is represented more at large, *fig. iii*; the
part

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part K differs from it only in the shape of its hooks, and the position of its handle, which is in the middle of it: D is supported on the pieces F F, in the ends of the frame, I, *fig. i*; and, as D is not as long as the interval between the ends of I, it allows it a lateral as well as a circular motion. C is a small bar bent at the end, and drilled at the bent part so as to slip forwards and backwards; on the axle F there is a slit in its head, through which the iron spindle of the handle, H, passes, and keeps it in its proper position; the ear bent down by the handle, H, when pressed by the thumb towards H, moves C forward on F, and, in this position, the hooks of this frame meet the turning hooks, or pass exactly under them; but when the thumb is removed, and the handle, H, pressed to the left, the hooks of this frame then pass between the intervals of the turning hooks: the hooks of this frame, D, are represented larger at *fig. xvii*; the hooked part is bent till it comes opposite the body, leaving an interval sufficient for the twine to pass between
tween

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tween its end and the body of the hook : these hooks are firmly fixed between D, which is an iron plate, and a piece of mahogany of the same size, by the screws there represented ; the bent part of the tail of the hook enters into the mahogany : the part, *fig.* xviii, is put between every two hooks, to preserve the proper interval between them, and a slip of leather passes all along between them and the iron ; and thus, when the screws are turned tight, all the hooks are very firmly fixed (the mahogany of these pieces should be very hard, to prevent the heads of the screws from sinking into it, which they are otherwise apt to do) : the hooks of K are represented of a larger size, *fig.* xvi, and secured in the same manner as those of D.

The turning-hooks are moved in manner following (see *fig.* iv):—behind the pinions of those hooks there is placed the rack, B, which moves in a groove cut in the mahogany frame ; in each end of this groove is a mortice, through which passes a piece of iron from the rack, at right angles

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angles to it, to the back of the piece in which the groove is made: the iron bar (of which part is seen at V, *fig. i*) moves on a bolt passed through it, and through the holes C; and another similar to it, is bolted on at the hole G: the heads of these bars have slits in them, through which screws pass to the pieces that project backwards from the rack, B; and their lower extremities are fastened by screw and nut to the deal piece, N, *fig. i*, which piece has a place cut in it, to admit the knees of the person who works on the machine; and thus, as he presses the piece N, with his knee to the right, the heads of the part V press the rack to the left, and thus turn all the hooks as far one way as is required; and when he presses N to the left, the hooks are turned the contrary way.

The netting hangs on the turning hooks, descends below the roller, L, *fig. i*, then passes under a weighted roller which hangs loose in the netting, and afterwards ascends and passes over the roller L to the roller M, on which it is rolled up as it is made; and

M is

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M is secured from returning, by a catch and ratchet-wheel, in the common manner : a sketch of this is given at *fig. x*, where L and M represent the heads of the fixed roller, L and M, *fig. i*; B the turning hook, and C the moveable weighted roller which hangs in the netting. The frame, *fig. iv*, as before said, moves forwards and backwards: it is moved backwards by a cord that passes from it over a pulley in the top of the stand of the machine to the treadle, R, *fig. iii*, and is retained by the catch, E, of the part *fig. xiii*, in that position, which falls down between it and the first frame, *fig. vii*; two heavy weights draw it forwards by cords, which pass from them over pulleys in the front of the stand to it, when the part C, *fig. xiv* (which goes across all the jacks, and draws them up into the catches), is pulled down by the treadle, R, *fig. ii*: the part B, *fig. xiii*, is pulled down at its head; consequently the catch E, on it, is drawn up from between the frames, and the weights, no longer restrained by the catches, draw the frame,

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fig. iv, forwards. When the frame, *fig. iv*, is drawn forwards, the turning-hooks are then an inch before the heads of the jacks, so that the netting hangs quite clear of them: when it is drawn backwards, the heads of the jacks have their notches exactly under the turning-hooks' intervals; so that, when their catches are moved back by the flur, their heads rise between the turning-hooks, and draw up a loop each, when the twine is passed through to form the new row of meshes. Q, *fig. i*, is the seat on which the operator sits, and W W W, the stand of the machine: *fig. ii*, is a steel wire five feet and a half long, with each end formed as the end of a common netting-needle is: the best method of putting the twine on this needle is, to make a loop at one end, then draw the twine to the other end, and make another loop there; then back to the first loop, and draw a loop of the twine through it, and another loop through this new loop; then draw it to the other end, and do the same there; and so on, till there is twine enough for the
needle.

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needle. The use of this method is, that it admits the twine to be drawn off the needle as it is wanted, without shifting the needle or putting the hand to it, which is a great saving of time ; these loops may be drawn through with ease by small hooks: the needle, when not in use, lies in a small trough of its own length, one of which is placed at each side of the machine, of the height, and in the line of direction of the bottoms of the turning-hooks.

The figures below *fig. 1.* shew the method of forming the knot ; and what is here represented of one hook of each sort, is performed in the machine by sixty-eight of each at one time.

1. Shews the mesh on the turning-hook, in its first position.
2. Here the hook, A, is pushed into the mesh, and the turning-hook turned half round ; and the hook, B, pushed into the interval, between the crossing of the sides of the mesh and the bottom of the turning hook.

3. The

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3. The mesh is drawn up the turning-hook, by the hook B ; the turning-hook is turned back to its first position, and the lower part of the mesh is passed over the hook of the turning hook, by the the hook A.
4. The hook A is removed, and the upper part of the mesh drawn over the hook of the T hook, and the lower part of the mesh which it contains, by the hook B.
5. The hook A is pushed into the new loop formed by the motion A ; the new loop is pressed down by the hook A, so as to leave the interval between it and the bottom of the T hook as large as possible ; the T hook is turned one quarter round, that the said interval may face the end of the needle ; the needle is drawn through, and leaves the twine behind ; the hook A is drawn back, and embraces the twine it leaves.
6. The hooks remain in the position of 5 ; the jacks (of which K and K represent the heads) are made to ascend one after
U another

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another between the T hooks, previous to the jacks being made to ascend the frame; *fig. iv* is drawn back.

7. The T hook is turned back to its first position; the hook B is drawn upwards, while the hook A is held down, by which the knot is drawn open in its proper situation; and, at the same time, by pressing the hook B a little forward as it rises, the knot is drawn off the turning-hook T: the hooks A and B are moved at one side, so as to be between the intervals of the T hooks; they are pressed a little back, that the side of the new mesh may lie over the hook of the T hook: the part C, *fig. xiv*, is pulled down by the treadle R, *fig. ii* (by which all the jacks are drawn down, their ends placed in their catches, and the catches of the parts B, *fig. xiii*, drawn up from between the frames, *fig. iv.* and *fig. vii*, which permits the weights to draw the frame, *fig. iv*, forwards); and at the same time the hooks A and B are pressed down, which places the new meshes on the T hooks,

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hooks, while at the same time it frees them from the jacks: the hook B is withdrawn, pressing it at the same time a little upwards: the hook A is withdrawn, pressing it a little downwards:—and thus the knot and the mesh are completed.

The jacks, turning-hooks, jointed frame, H and I, front part of K and D, the guides G, the hooks of K and D, the parts C and B, *fig. iv*, the sleigh, *fig. vii*, the parts *fig. xiii* and *xiv*, the flur, *fig. vi*, the bars V, *fig. i*,—are all made of iron. The catches, *fig. ix*, the combs, *fig. viii* and *fig. xi*, the supports of the turning-hooks, C and F, *fig. iv*, and the rack B,—are all made of brass. The frames, *fig. iv* and *vii*, and the backs of K and D, *fig. i*, are made of mahogany; and the stand of the machine, and the parts S and N, the wheel P, and the rollers,—are made of deal.

N.B. The Drawings sent by Mr. Boswell, shew the parts of the machine of the full dimensions; but, as it was not possible

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to make them of that size in the annexed Plate, the original Drawings are reserved in the Society's Collection for the use of the Public.

PAPER